

TECHNICAL REPORT EL-81-3

EVALUATION OF UNDERDRAINAGE TECHNIQUES FOR THE DENSIFICATION OF FINE-GRAINED DREDGED MATERIAL

by

David P. Hammer

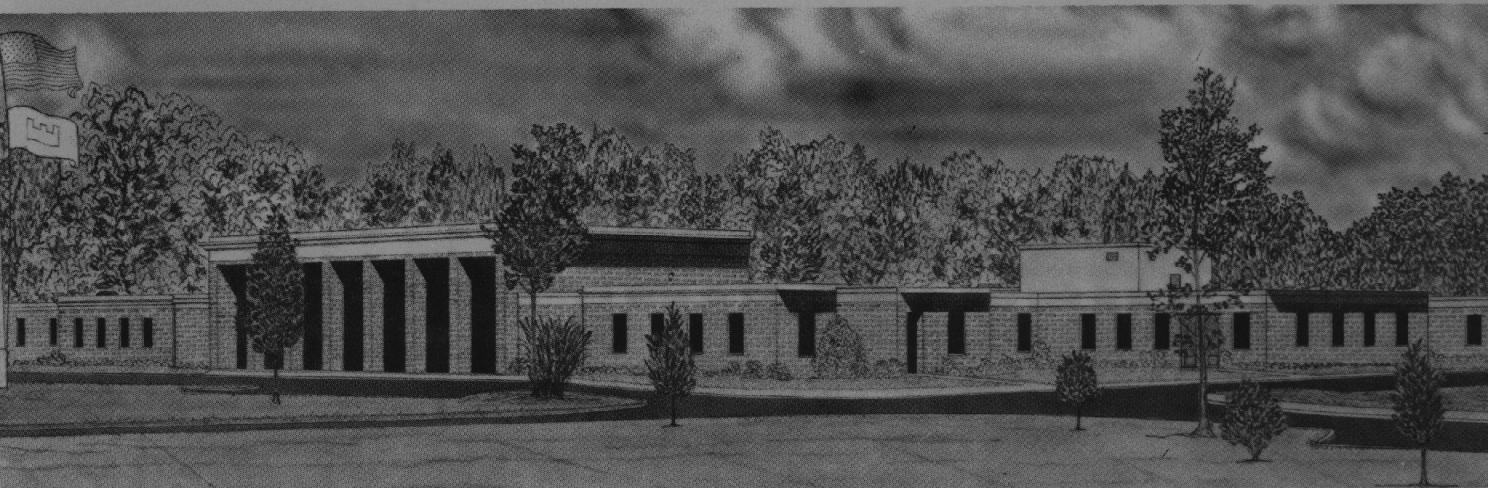
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U. S. Army Engineer Waterways Experiment Station
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The result of a large-scale field experiment to evaluate the dewatering/ densifying of fine-grained dredged material with underdrainage techniques is herein described. The techniques evaluated were: gravity underdrainage, par- tial vacuum in an underdrainage layer, seepage consolidation, and seepage con- solidation with a partial vacuum in the underdrainage layer. The experiment was conducted using five test sections having 30- by (Continued)		

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30-ft bottom areas and 1V on 2H sideslopes. One section was used for each of the four techniques evaluated and one section was not treated. The untreated or control section provided a basis against which the effectiveness of the techniques evaluated could be measured. Settlement, pore pressure, water content, and vane shear measurements were taken to provide a basis of evaluation. Initially, a 6-ft nominal thickness lift of dredged material was used; then, after one year, a second 6-ft lift was added. The experiment ran for a total of approximately two years.

All of the techniques evaluated produced more densification than did the test section containing untreated material. Of the techniques evaluated the partial vacuum in an underdrainage layer was the most effective. This was true with both lifts of dredged material tested but was considerably more pronounced with the first lift than the second.

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PREFACE

The study reported herein was made by the Geotechnical Laboratory (GL), U. S. Army Engineer Waterways Experiment Station (WES), under the direction of Mr. James P. Sale, Chief, as part of the Corps of Engineers Dredged Material Research Program (DMRP), Disposal Operations Project (DOP), DMRP Work Unit No. 5A15. The DMRP was sponsored by the Office, Chief of Engineers, U. S. Army. The scope of the DMRP work unit was expanded and sponsored by the U. S. Army Engineer District, Chicago. Preparation of the final report was sponsored by the Dredging Operation Technical Support (DOTS) Program. Mr. David P. Hammer prepared this report under the general supervision of Mr. C. L. McAnear, Chief, Soil Mechanics Division, GL.

The DMRP was assigned to the Environmental Laboratory (EL), under the general supervision of Dr. John Harrison, Chief; the DOP Manager was Mr. Charles C. Calhoun, Jr.; and Dr. T. Allan Haliburton, DMRP Geotechnical Engineering Consultant, was manager for the DOP Work Unit. The DOTS Program Manager is Mr. Calhoun.

The Directors of WES during the work and publication of this report were COL J. L. Cannon, CE, and COL Nelson P. Conover, CE. Technical Director was Mr. F. R. Brown.

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CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI)
UNITS OF MEASUREMENT

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
cubic feet	0.02831685	cubic metres
feet	0.3048	metres
horsepower (550 foot- pounds per second)	745.6999	watts
inches	0.0254	metres
mils	0.0000254	metres
pounds (mass) per cubic foot	16.01846	kilograms per cubic metre
pounds per square foot	4.882428	kilograms per square metre
pounds per square inch	6894.757	pascals